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(54) **Anti-vibration, anti-shock handle for a racket for tennis or similar sports, and related method of production.**

(57) An anti-vibration, anti-shock handle for rackets for tennis and similar sports, in which between the shank (2) of the racket frame (1) and the proper handle, consisting of two half shells (8,9), a plurality of shock absorbing elements (6,6') are interposed, made of soft material, such as elastomer, gel or the like, spaced out from each other in such a way as to leave empty spaces (12).

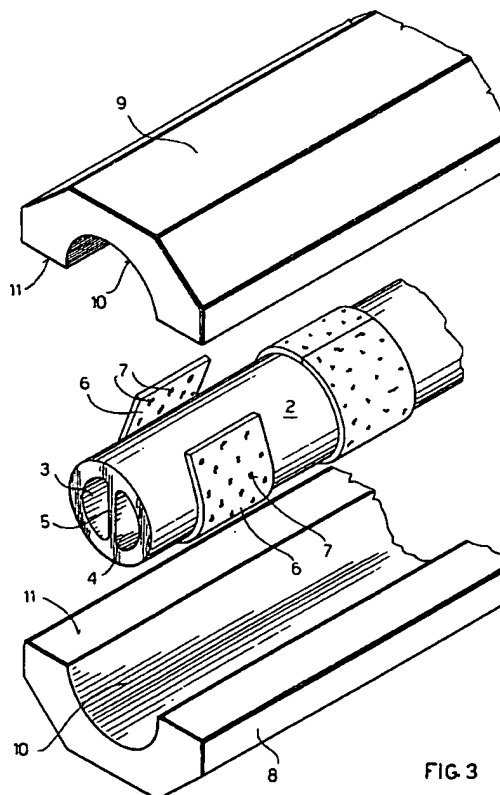


FIG. 3

The present invention refers to an anti-vibration handle for rackets for tennis, squash and similar sports, which is completely insulated from the frame, and a related method of production.

The sections of tennis racket frames have undergone an evolution in recent years, becoming narrower, profiled and higher.

These new generation rackets, defined as "wide body", have:

- more rigidity and greater ability to drive the ball,
- vibrations which have higher frequency but lower amplitude and duration with respect to those of the old generation, having a more "rounding" frame section.

It is well known that a tennis player is subject to frequent risks of inflammation and injuries to the fore-arm and especially the elbow (an illness known as epicondylitis or tennis elbow).

These situations are due to the combined action of:

- vibrations of the racket which are transmitted to the upper limb of the player;
- shock due to the impact of the ball on the strung surface of the racket, which is also transmitted to the player.

As already stated, in the "wide body" racket the influence of the vibration factor is reduced, but the shock factor is increased.

To reduce the latter, attempts have been made to insulate the rackets from the handle, for example by interrupting it and joining it to the grip by interposing an elastic joint. This system is quite valid but very expensive.

Other system consist in injecting soft materials around the shank of the racket before molding the octagonal polyurethane handle thereon, or in padding the binding band (grip) with soft material before winding it around the handle.

Although these techniques are cheaper they are not very effective.

Another proposed system consists in using a hollow detachable handle, inside of which an expensive complex fastening element is inserted, made of a light alloy, incorporating rubber insulating elements.

This system is very expensive and has been unsuccessful on the market, both because of the exorbitant price of racket, which is more than twice the price of a quality racket, and because it tends to vary the ideal static and dynamic balancing of the racket, which in consequence loses some of its playability.

US-A-4 660 832 describes an anti-shock and anti-vibration handle for tennis rackets and the like, wherein between the shank and the external shell a tubular shock absorber element is foreseen, substantially extending throughout the length of the

handle. According to another form of realization, in the place of the tubular element, a plurality of parallel longitudinal strips is foreseen, also extending throughout the length of the handle. According to one of the embodiments, said external shell made of aluminum, plastics or the like, is in two halves.

The solution described in the above document is not satisfying, since the longitudinal continuity of the tubular element or of the strips favours the diffusion of vibrations from the frame to the end portion of the handle, where the utilizer normally seizes the same, existing a continuing link between the shank and the external shell.

The aim of this invention is to provide a racket for tennis or similar sports, with very good insulation of the handle from the frame, and which is of low cost, without alterations in its balancing or weight.

This aim has been achieved, according to the invention, by foreseeing at least one element made of soft material, for example elastomer or gel, between the shank of the frame and the handle suitably spaced out from each other, in the form of strips which are wound onto the shank of the frame, or of closed rings which are fitted onto the shank.

According to the invention, the external dimension of the shank are reduced by the thickness corresponding to the shock absorbing elements which are positioned on it.

The procedure according to the invention consists in

- applying onto the shank of the frame the soft shock absorbing elements, made for example of elastomer or gel, in the form of strips which are wound round and glued onto the shank, or of rings which are fitted onto it;
- realizing separately two half shells, preferably equal, which will form the racket handle;
- assembling the two half shells, onto the shock absorbing elements of the shank, gluing them onto it and compressing them together so as to compress said shock absorbing elements slightly and to be able to glue the matching limbs of the two half shells.

In this way an applied handle is obtained which is completely insulated from the inner shank making up part of the frame, by means of the shock absorbing elements made of soft material such as elastomer or similar materials, and by empty spaces between the elements.

Finally the bottom is mounted and the grip is wrapped round in the traditional manner, completing the locking of the parts together.

It can be seen, therefore, that with the procedure according to the invention, the handle is made separately in two half shells, for example by mold-

ing expanded polyurethane, instead of being injected onto the shank of the frame.

According to the present invention, the link between the half-shells and the inner shank, which is carried out in the form of longitudinal transverse discontinuous lines, makes the same half-shells a system which does not resonate with the vibration propagating along the inner shank.

Further characteristics of the invention will be more clearly understood from the detailed description which follows, referring to the one of its purely exemplary and therefore not restrictive embodiments, illustrated in the appended drawings, in which:

- figure 1 is a view, partly in longitudinal section, of a handle of a racket for tennis or similar sports according to the invention;
- figure 2 is an enlarged transverse section taken along line II-II in figure 1;
- figure 3 is a partially exploded view, showing in diagrammatic form the assembly phases of the handle according to the invention;
- figure 4 is an end view of a modified embodiment of a shock absorbing element of the handle according to the invention before assembly onto the shank of the racket frame; figure 5 is a median section taken along line V-V of figure 4;
- figure 6 is a section like the one in figure 5, showing the shock absorbing element after assembly and compression.

In figure 1, reference numeral 1 indicates a monolith frame (shown only in part) of a racket for tennis or similar sports, obtained for example by molding suitable materials, such as glass fibre, carbon and suchlike, impregnated with suitable resins.

In the appended figures the shank 2 is shown as being of circular section, with two inner cavities 3, 4, separated from each other by a bulkhead 5. It is obvious, however, that the shank 2 can have any type of section, and possibly also only one inner cavity, since this does not have any effect on the aims of the invention.

On the other hand, the invention requires a reduction of the outer dimensions of the section of the shank 2 with respect to those of a traditional racket with the same outer dimensions of the handle, for the insertion of the shock absorbing elements, which will now be described.

According to the invention, a plurality of shock absorbing elements 6 (four in the shown example) are positioned around the shank 2, spaced out from each other, for the purpose of insulating the handle

from the frame 1 completely.

The shock absorbing or insulating elements 6 are preferably strips of elastomer, gel of similar soft materials, which are wound round and glued onto the shank 2, as can be seen in diagrammatic form in figure 3. One or both of the faces of the strips 6 may possibly be provided with notches 7, for the adhesive to hold better, between the strips and the shank and possibly between the strips and the outer handle, as will be dealt with below.

The handle is made of two half shells 8, 9, preferably equal to each other, realized separately, by molding expanded polyurethane, for example. Each half shell 8, 9 has inner longitudinal cavity 10 which reproduces the outer profile of the shank 2, a semi-circular cavity in the shown example, in such a way that the coupling of the two half shells 8, 9 determines a cavity housing the shank 2, onto which the shock absorbing elements 6 have previously been positioned.

During the coupling of the two half shells 8, 9, glue or adhesive material may be foreseen in these zones, in order to make the shock absorbing elements hold better.

The coupling of the two half shells 8, 9 takes place by means of a certain pressure, so as to compress the elastomer strips 6 slightly and cause the half shells themselves to adhere, after putting glue or two-sided adhesive material between the matching edges 11 of the half shells.

Finally the bottom is assembled onto the shank 2 and the grip is wrapped round in the traditional manner, completing the locking of the parts together.

A handle is thus obtained which is completely insulated from the inner shank 2 making up part of the racket frame 1, by means of the strips of elastomer 6, thus eliminating all the problems described above.

In figure 4 and 5 a modified embodiment of the shock absorbing or insulating element is shown, in the form of a closed ring 6', which is fitted onto the shank 2.

In figure 6 the decrease in the thickness of the ring 6' is seen (the same obviously holds good for the strips 6 also), after assembly and compression due to the coupling of the two half shells 8, 9.

From what has been shown above the advantage of the solution proposed by the invention are clear to see, in that it is extremely simple and economical, and allows the handle to be insulated from the shank 2 by means of the elastomer elements 6, which are separated from each other by empty spaces 12.

This longitudinal discontinuous link between the shank 2 and the half shells 8, 9 prevents vibrations from propagating from the frame 1 to the end of the handle, where the racket is normally

seized.

Claims

1. An anti-vibration and anti-shock handle for a racket for tennis or similar sports, comprising an inner shank (2) in one piece with the racket frame (1), covered with a layer of material, making up the proper handle formed of two half shells (8,9) and wrapped round in its turn with a band (grip), between said shank (2) and said proper handle (8,9) shock absorbing elements (6,6') are interposed, made of soft material, inserted on the shank (2), characterized in that said shock absorbing elements (6,6') are transversely placed with respect to the shank (2) and are longitudinally separated from each other by empty spaces (12). 5 10 15
2. A handle according to claim 1 characterized in that said shock absorbing elements consist of strips (6), which are wound round and glued to the shank (2), so as to cover the whole perimeter of the same. 20 25
3. A handle according to claim 1 characterized in that said shock absorbing elements consist of closed rings (6') which are fitted onto the shank (2). 30
4. A handle according to any one of the previous claims, characterized in that said shock absorbing elements (6,6') have notches (7) on their inner surface and/or on their outer surface. 35
5. A handle according to any one of the previous claims, characterized in that said shock absorbing elements (6,6') are made of elastomer, gel or such like. 40
6. A handle according to any one of the previous claims, characterized in that said proper handle is obtained by coupling and pressing together two half shells (8,9), obtained by pressing expanded polyurethane. 45
7. A racket for tennis or other such sports, provided with a handle according to any one of the claims from 1 to 6. 50
8. A method for the production of a handle for a racket for tennis or other such sports, which is insulated from the racket frame (1) comprising the following phases: 55
 - transversely applying a plurality of elements made of soft material, such as elastomer, gel or suchlike (6,6') around

the shank (2) of the racket, in such a way that they are longitudinally separated by empty spaces 12;

- realizing separately by pressing expanded polyurethane two half shells (8,9), preferably equal to each other, shaped in such a way so as to determine, when they are coupled together, a longitudinal cavity suitable for housing the shank (2) with said elements (6,6') made of soft material;
- possibly applying glue or adhesive material on the opposing free edges (11) of the two half shells (8,9);
- pressure mounting the two half shells onto the shank (2) so as to compress slightly said elements made of soft material (6,6') and to cause the two half shells (8,9) to adhere together;
- winding an adhesive band (grip) onto the outer surface of the two half shells (8,9).

9. A method according to claim 8, characterized in that said elements made of soft material consist of strips (6) which are wound round the shank (2) so as to comprise the whole perimeter, and glued to it.

10. A method according to claim 8, characterized in that elements in soft material are made of closed rings (6') which are inserted on a shank (2).

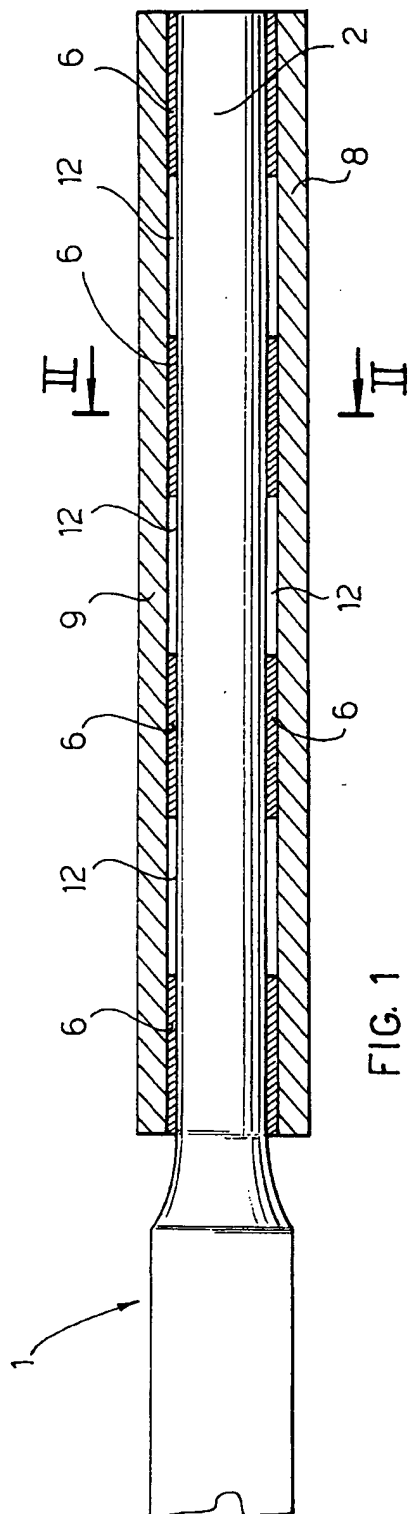


FIG. 1

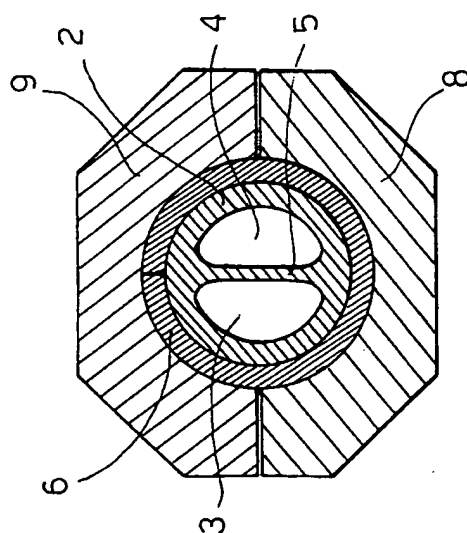


FIG. 2

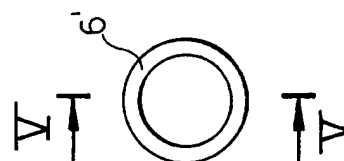


FIG. 4

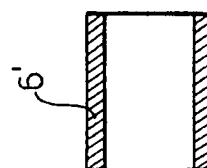
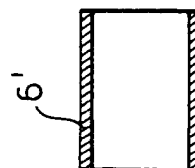


FIG. 5



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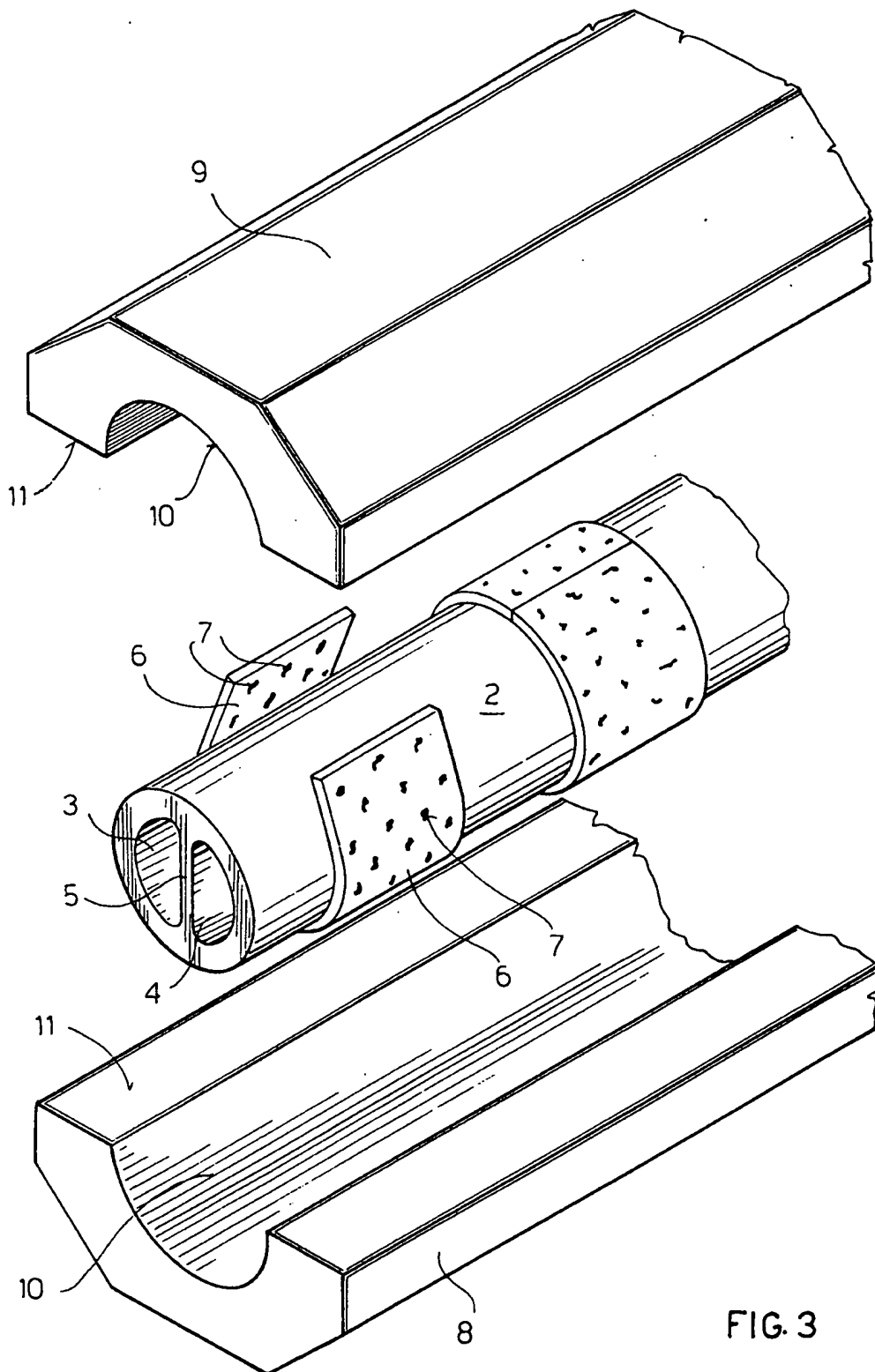


FIG. 3



European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 92 10 9787

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-4 660 832 (R.D.SHOMO) * column 2, line 3 - line 6 * * column 5, line 1 - line 46 * ---	1,8	A63B49/08
A	US-A-4 953 861 (M.NAKANISHI) * column 3, line 9 - column 4, line 30 * ---	1,8	
P,X	DE-U-9 112 749 (H. HSU) -----	1-10	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A63B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 30 SEPTEMBER 1992	Examiner GERARD B.
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